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ABSTRACT

This study experimentally assessed the effectiveness of two variations of an instructional technique, Teams-Games-Tournament (TGT), in high school American history classes. A 3 x 2 (treatment by teacher) design was employed using intact classes over a 12-week period. TGT proved to have significant positive effects on academic achievement, student attitudes, and cognitive beliefs. Systematic TGT effects were also observed for dimensions of classroom cognitive climate, as measured by the Class Activities Questionnaire. Few differential effects were noted across the two TGT variations. The results, combined with those from prior research with TGT, suggest that the technique has widespread effects on students' learning activities and attitudes and represents an important instructional variation for secondary school classrooms. (A 37-item bibliography, 12 diagrams, 8 tables, and 5 appendixes are included.) (Author)

ED 093884

TEAMS-GAMES-TOURNAMENT IN THE SOCIAL STUDIES CLASSROOM: EFFECTS ON ACADEMIC ACHIEVEMENT, STUDENT ATTITUDES, COGNITIVE BELIEFS AND CLASSROOM CLIMATE

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Introductory Statement

The Center for Social Organization of Schools has two primary objectives: to develop a scientific knowledge of how schools affect their students, and to use this knowledge to develop better school practices and organization.

The Center works through three programs to achieve its objectives. The Schools and Maturity program is studying the effects of school, family, and peer group experiences on the development of attitudes consistent with psychosocial maturity. The objectives are to formulate, assess, and research important educational goals other than traditional academic achievement. The School Organization program is currently concerned with authority-control structures, task structures, reward systems, and peer group processes in schools. The Careers program (formerly Careers and Curricula) bases its work upon a theory of career development. It has developed a self-administered vocational guidance device and a self-directed career program to promote vocational development and to foster satisfying curricular decisions for high school, college, and adult populations.

This report, prepared by the School Organization program, examines the effects of the Teams-Games-Tournament instructional technique on students in high school social studies classes.

Acknowledgment

The authors are indebted to the invaluable contributions of the following individuals: Marie L. Cain and Ann DeGiovanni for creative implementation in their classrooms; Frank Brown for assisting in finding a setting within which to conduct the experiment; John Snyder for his assistance with the data analysis, James McPartland and John Hollifield for their critical readings of earlier drafts, and Ann Forthuber for typing the several drafts.

INTRODUCTION

Experimental evaluation of innovative instructional techniques is an important prerequisite for the orderly development of instructional psychology (Glaser & Resnick, 1972). While the literature is replete with normative models for such evaluational research (cf. Scriven, 1967; Campbell, 1969; Stufflebeam, 1969), there are few actual examples of experimental evaluation (Welch, 1969; Cooley, 1971; Welch & Walberg, 1972). The discipline of instructional psychology needs fewer prescriptive models of evaluative research and a more extensive literature of actual evaluation of instructional programs. The present study evaluates the effectiveness of an instructional technique, Teams-Games-Tournament, when used in high school Social Studies classes.

The Technique

Teams-Games-Tournament (TGT) is an instructional technique which structures competition-cooperation in the classroom along dimensions advocated by Coleman (1959) and Bronfenbrenner (1970). It is designed to complement regular instructional methods in upper elementary and secondary school classrooms. TGT is structured as follows:

> The classroom is divided into four-member, heterogeneous student teams. Each team represents the range of academic ability in the classroom. Each team is assigned grades based on team performance, and is allowed frequent practice sessions during which teammates can assist each other on relevant academic tasks.
>
> The students perform on a series of instructional games designed to assess and reinforce knowledge on classroom relevant concepts and skills. The games used can be either commercially produced or designed on an ad hoc basis by the individual teacher.

> Students from each team compete individually in frequent tournament sessions designed around the instructional games. Such competition takes place against students of comparable academic ability from other teams. The results of such competition are reported publicly at both the individual and team level.

The mechanics of the TGT technique have been reported in detail by DeVries, et al., (1973). The results from two field experimental evaluations of TGT conducted to date suggest the technique has the following effects. When compared to instructional techniques employing individual competition, TGT creates (1) greater academic achievement (Edwards, et al., 1972; Edwards & DeVries, 1972), (2) greater peer tutoring and mutual concern among the students (DeVries & Edwards, 1973), and (3) more frequent and constructive interpersonal relationships across both racial and sex lines (DeVries & Edwards, 1972).

Present Study

The present study was designed to meet the following two objectives: (1) to extend the evidence of TGT's effectiveness by evaluating TGT in educational contexts not before utilized, and (2) to examine the effects of spotlighting the performance of low ability students in TGT.

The two experimental evaluations of TGT conducted to date both took place in seventh grade mathematics classes. Both studies controlled for possible teacher effects in the experimental design. To extend the assessment of effectiveness of TGT as an instructional technique, the technique needs to be used in different subject areas, with students of different age levels, and with several teachers in different teaching environments. To that end, the present study implemented TGT in high

school American History classes, with two teachers, teaching classes of vastly different sizes (25 vs. 50 students per class).

An important structural feature of TGT is the way that the team scores are formed. Student teams typically are assigned a team score based on the average performance of all teammates. The average performance contingency may result in teammates discounting, and at times even dismissing, the work of the low performers on the team. It is relevant to ask whether rearranging the team scoring system can cause the team members to focus greater attention and peer-tutoring efforts on low performing teammates.

Hamblin, et al., (1971) conducted a study in which the effects of alternative team scoring systems (for 7 to 9 member groups) were assessed on academic achievement. Three variations were used: average performance, high performance, and low performance. In the average performance condition a team's score was determined by taking the average of all the teammates' individual performances. The high performance condition formed a team score based on the top three performances on the team. In the low performance condition, the team score was based on the bottom three performances within the team. The results indicated that the low performance condition most effectively improved overall academic achievement. The treatment had a particularly facilitative effect on the low performers, and the high performing students did no worse than under the other contingencies. The facilitative effects of the low performance contingency appeared to be due, in part, to increased (within team) peer tutoring; with the high performers tutoring the low performers. The present study assesses the effects of team

scoring by comparing TGT using team averages with a TGT treatment using team scores weighted toward the low performing teammates.

Classroom Outcomes

As noted by Glaser & Resnick (1972) in their review of instructional psychology, one problem with curriculum evaluation is the frequent limited measurement of one particular classroom objective. As they state, evaluational efforts should proceed with the following two assumptions: (1) Multiple classroom objectives should be measured, and (2) multiple measures of any given classroom objective should be employed. Consequently the current study measures the effect of TGT on basic academic achievement, student attitudes toward the class and subject matter, and the instructional climate (cf. Steele, et al., 1971; Walberg, in press) of the classes involved. In addition, at least two measures of each outcome are included in order to provide more reliable data on treatment effects for each set of outcomes.

METHOD

Subjects

The subjects were 191 students attending a suburban high school. Sixty-four percent were tenth graders, twenty-six percent were eleventh graders, and ten percent were twelfth graders. Seven percent of the sample were minority group students, and 47% were males. The study used six American History classes. Tests of the initial comparability of the six classes were conducted for several variables. All tests failed to

disprove the null hypothesis [Social Studies Achievement ($F < 1.47$; $df = 5,187$), English Achievement ($F < 1$, $df = 5,170$), Father's Education ($F < 1$, $df = 5,187$), and Educational Aspirations ($F < 1$, $df = 5,187$)].

Design

The study was conducted for a twelve-week period during the fall semester and employed a 3 X 2 (treatment by teacher) design. Intact classes were used. The three treatment levels were Individual Competition (IC), Teams-Games-Tournament-Average (TGT-A), and Teams-Games-Tournament-Weighted (TGT-W). For the teacher factor, two classroom arrangements were represented: Teacher #1 had large classes (45-55 students per class), was assisted by a junior teacher, and had special seating arrangements (a series of small rooms with tables and chairs) for small group interaction. Teacher #2, in contrast, had smaller classes (25-30 students per class) and taught in a traditionally structured (architecturally)classroom. The teachers were female. All classes met during the morning, and possible period effects were controlled for in the assignment of treatments to classes.

Treatments

All classes met daily (55-minute period) throughout the twelve-week period. The textbook and primary source materials used were held constant across treatments. The major text used was People Make a Nation (Sandler, et al., 1971), and the following topics were covered: United States Constitution, American political institutions, breakdown of the political system (Civil War), and Reconstruction.

Individual Competition (IC): The IC students followed this weekly schedule: Every Monday each student was handed a list of ten questions, six of which would be asked on that Friday during a class quiz. A portion of the period (between 20 and 40 minutes) on every Tuesday and Thursday was allotted to unstructured study sessions. During this time each student was expected to prepare (by consulting the textbook and primary sources) for the upcoming quiz. Students were allowed to work either by themselves or with others. The remainder of the instructional time involved class level learning activities, with teacher lectures and open class discussions being the dominant media.

Each Friday quiz consisted of all students answering six of the ten questions assigned on Monday. The subset of six was selected randomly by the teacher and was held constant across the three experimental conditions. Before each quiz the teacher exhorted the students to do well, and reminded them that they would have to out-perform their classmates to receive a high score because she was grading "on the curve." On the Monday following each quiz, each student's paper was returned with a letter grade at the top. Each student was told that his weekly quiz score would count heavily toward his semester grade.

Teams-Games-Tournament-Average (TGT-A): The weekly schedule of the TGT-A treatment was similar to that used in Individual Competition. At the beginning of the experiment students were assigned, on a stratified - random basis, to a five or six-member team. The teams were stratified on

both prior social studies achievement[1] (using three levels) and sex (each team had from two to four females). The team composition remained the same during the entire twelve-week period. During the first day of the experiment the students were told (1) they would be assigned to teams, (2) their team's score would count heavily on their course grade and (3) their team would be in competition against the other teams for high grades.

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Insert Figures 1 and 2
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Weekly quiz sessions were held on Fridays, as in the IC condition. The quiz was labeled as a tournament in the TGT-A condition. Each Friday's tournament proceeded as follows: Each student was assigned to a six-person tournament table, with each person at the table representing a different team. Figure 1 depicts how such assignment to six-person tournament tables might be implemented for a classroom composed of six five-member teams. The selection of one team representative for each tournament was made on a random basis. Consequently across tournaments each student was likely to face in the tournament all of the students representing the other teams.

The tournament play began with each participant randomly selecting one of the ten questions assigned earlier in the week.[2] After a five-minute

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1 The achievement measure was a standardized social studies test administered to all students approximately six months before the commencement of the current study. The stratification on prior social studies achievement was designed to create teams of overall comparable ability.

2 The tournament structure employed in the current TGT tournament differs in two ways from that used earlier by the authors (DeVries & Edwards, 1973; DeVries, et al., 1973). The competition at the tournament tables in the current study did not involve competition among students of comparable ability levels. Secondly, because of the complexity of the required answers in the tournament, reference to a single answer sheet was not allowed, rather a group of three competitors were required to make independent judements of the adequacy of each person's answer.

preparation period each participant was given the opportunity to answer the question he selected. (An example of the questions employed in the tournament would be naming at least three delegates to the Constitutional Convention). Three of his competitors at the table rated his response on a six-point scale. Figure 2 depicts the grading process. In this case the answer of the representative of Team A (A_3) is being rated by the three competitors C_5, D_1, and E_4. When the rating of A_3's answer was completed, the play would proceed by having B_1 answer the question he selected, with his answer in turn rated by D_1, E_4 and F_1. After each participant at the table had the opportunity to answer his selected question, the individual scores were calculated by taking the average of the ratings given by the three peers.[3]

The team scores were announced to the students on the following Monday through bulletin board notices, handouts, and teacher announcements. The feedback was concentrated at the team level. Team scores were calculated by taking the average of the individual teammates' scores. Team scores were then ranked, with special written and oral comments made about which teams were in the top slots and which teams were moving rapidly up or down in the rankings. The teams were compared on both a "weekly" and "season record" basis. Each team was also provided with a sheet listing both the weekly and season record scores of each teammate.

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[3] A pilot study had been conducted by the experimenters to determine if the students would view peer ratings of academic performance as equitable. The pilot test indicated students viewed the ratings in the tournament as fair if the raters were given clear guidelines as to the desired answer. The students felt such guidelines would reduce the subjectivity of the ratings, thus reducing considerably the chance a student would receive a low rating merely because the rater did not like him. In the present study the tournament raters were provided such guidelines, and the response of the students to the tournament was positive, as will be documented subsequently in the paper.

Teams-Games-Tournament-Weighted (TGT-W): This treatment condition differed in only one aspect from the TGT-A treatment--the calculation of team scores. The TGT-W condition weighted the scores of the low performing teammates. Figure 3 shows an example of the weighted scoring system. As indicated in the figure, each teammate's raw score was multiplied by the

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rank of his score to form a composite score. The composite scores were summed and divided by the number of teammates to form the team score. The importance of the low performers in determining the team score is illustrated in Figure 3. The bottom three performers in this case contributed 80% of the total team points. For the TGT-A condition these same individuals would have contributed only 55% of the points.

Dependent Variables

The selection and measurement of dependent variables in the present study were influenced by three considerations: (1) Because the study is exploring the usefulness of a new instructional technique it appeared desirable to measure multiple outcome variables. A new instructional technique should be evaluated not on the basis of its effect on one selected outcome variable, but rather on its effects across a range of outcome variables reflecting a vast array of learning objectives or goals. Consequently, student attitudes, cognitive beliefs, academic achievement, and classroom cognitive climate are all measured. (2) Because the present study is a non-equivalent control group design, both pre and posttest data are collected for as many of the dependent variables as possible.

(3) Because of the apparently considerable error component present for any given outcome measure (Webb, et al., 1966), the authors included multiple measures of a major portion of the outcome variables.

Academic Achievement: Two measures of social studies achievement were administered representing different levels of specificity of treatment. The first was the SCAT-STEP, series II, Social Studies Subtest,[4] representing a general measure of social studies skills. This was given on a pre and posttest basis. The second achievement measure was treatment specific--a test composed of six questions selected randomly from the twelve tournaments employed during the experiment. Examples of the questions are: "List four delegates to the Constitutional Convention in 1787, and give one important characteristic of each;" "Give some of the reasons for the delaying of the Emancipation Proclamation." Using teacher provided guidelines, the items were corrected by several research assistants. The observed inter-rater reliability from the grading of the test was .92. The test was given on a posttest basis only.

Attitudes and Cognitive Beliefs: Another important set of educational outcomes are student attitudes and cognitive beliefs. Attitudes are defined as general affective responses to either the class, as it was experienced during the experimental period, or to the subject area in general. For those interested, Appendix A contains a detailed description of each attitude and cognitive belief scale employed in the current study. A brief description of each scale follows:

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[4] The social studies subtest of the SCAT-STEP measures basic knowledge and analysis skills (Bloom, 1956) of the student. As reported in Buros (1965), the measures of the internal consistency of the subtest (using KR-20) range from .84 to .93. Estimates of its construct validity are not available.

The first attitude scale measured a student's attitude toward American History in general. The scale contains four items, with Likert-type response formats, and measures a general like or dislike of American History. The observed internal consistency of the scale for the present study was high (α = .81).

Two other more specific attitudinal scales--Satisfaction and Apathy--were employed. The scales were derived from a multi-dimensional measure of students' perceptions of the class entitled the Learning Environment Inventory (Anderson & Walberg, 1972). The Learning Environment Inventory (LEI) is a student questionnaire which consists of fourteen distinct dimensions of classroom process. The LEI has evidenced considerable reliability and validity (Walberg & Anderson, 1968, 1972; Anderson, 1970; Anderson, Walberg & Welch, 1969).

The Satisfaction and Apathy scales are the two LEI dimensions which would appear to tap the general affective responses of students toward the specific American History class. Both scales contain five items, with Likert-type response formats. Scale scores for each student were formed by summing the raw scores for the constituent items. The internal consistency of both the Satisfaction (α = .90) and Apathy scales (α = .76) was strong. The two scales were administered at the midpoint (six weeks into the treatment) and end of the experimental period. Because the scales assess student impressions of the class itself, and because the treatment was initiated during the first week of the school year, pretests were inappropriate.

Three sets of cognitive beliefs about American History were measured. The items for all three cognitive belief scales are listed in Appendix B. Cognitive beliefs in this context are defined as general hypotheses concerning the nature of the American History class. The distinction between attitudes and cognitive beliefs is important and has been addressed recently in the attitude theory literature (Fishbein, 1967; Kiesler, et al., 1969). The difference between cognitive beliefs and attitudes is basically one of "hypothesis concerning" versus "favorable or unfavorable feelings toward."

The most general of the three measures of cognitive beliefs concerns perceived Importance of Doing Well in American History. The scale score consists of the sum of the individual's responses to three items. The observed coefficient alpha was .58. Both pre and posttest data were collected on this measure. A second cognitive belief scale was termed Efficacy. The Efficacy scale measures the degree to which a student believes he has control over his fate in American History classes. The Efficacy scale consisted of four Likert-type items, and was administered on both a pre and posttest basis. The observed coefficient alpha was .71. The third cognitive belief measure, Difficulty, measures the student's perception of the level of difficulty of his American History class. Scale scores were formed from the sum of the individual's response across five items. The observed coefficient alpha was .83.

Cognitive Climate: Cognitive climate is the degree to which students in the classroom are engaged in on-task behaviors and the specific nature or content of these behaviors.

Two measures of cognitive climate were employed. The first is a general behavioral measure of the level of on-task behavior by students during the unstructured practice periods held every Tuesday and Thursday. The ratings were obtained using the Student Behavior Scale (SBS). The SBS was developed by the authors and evidence is available of its reliability and validity (DeVries & Edwards, 1973). Clerical assistants, trained in use of the SBS, observed a 50% randomly chosen sample of students in each class. Each class was observed three times (for approximately twenty minutes each time) during the last four weeks of the experiment. The on-task behavior variable was formed by taking the total number of on-task behaviors observed in a treatment group across the three observation periods.

A second measure of the classroom cognitive climate used was the Class Activities Questionnaire (CAQ). The CAQ is a student questionnaire which contains 26 items describing various dimensions (from Bloom's [1956] taxonomy of cognitive objectives) of cognitive activities emphasized in the class. Steele, et al., (1971) and Walberg, et al., (1973) provide evidence for the reliability and validity of the CAQ. A principal component factor analysis of the CAQ data was conducted in the present study. Using the scree test as the criterion (Cattell, 1966), a four-factor solution was judged as appropriate. Appendix C indicates the items which loaded .40 or greater on each of the four factors. The factors were characterized as follows: Analysis, Synthesis, Participation (affective domain), and Memorization (corresponding to Bloom's Knowledge level in his taxonomy). In addition, two items with response formats substantially different from the remainder of the CAQ items were analyzed separately:

Percent of Time Teacher Talks, and Amount of Homework. Appendix D, which contains the inter-scale correlations, indicates that the scales measure distinct concepts. It is important to note that the factor structure which evolved in the present study is substantially different from that obtained by Steele, et al., (1971).

The CAQ also uses a four-point Likert-type response format. Scale scores were obtained by summing the individual student's responses across the scale items. Because the CAQ requires the student to describe classroom cognitive processes, the CAQ was administered at the midpoint and end of the experimental period. In fact, the CAQ authors state that valid CAQ responses cannot be attained unless the class has been in process for a minimum of six weeks.

RESULTS

The data for all dependent variables except one were analyzed using the general linear model approach to the analysis of variance recommended by Cohen (1968). The advantage of using this technique over traditional ANOVA analysis is two-fold. First, more readily available regression analysis computer programs can be used to perform most of the calculations. Second, terms representing interactions between various trait variables and the treatment variables can be directly included in the analysis (Tobias, 1973).

For the dependent variables on which pretest data were collected, the pretest score was entered into the model as the trait measure. In general, the variables were ordered as follows: pretest score, teacher factor, treatment factor, the three two-way interaction terms (defined by product terms, as suggested by Cohen [1968]), and the three-way interaction term.

The teacher and treatment factors were coded as dummy variables (Kerlinger, 1973).[1] The general ordering of the terms follows the procedure described by Overall and Spiegel (1969) as method 3, in which an a priori ordering of all terms is used. For each term in the model the incremental R^2 (R_I^2) is calculated and tested for significance. As noted by Walberg (1971), R_I^2 provides a direct estimate of the variance in the dependent variable accounted for by the particular independent variable, above and beyond that explained by variables previously entered into the model.

The results are summarized for all fifteen dependent variables in Table 1. The table indicates level of significance for the Teacher factor,

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Treatment factor, and Teacher-by-Treatment interaction. Significant Teacher main effects ($P < .05$) were noted for three dependent variables; all three were measures of the classroom cognitive climate. The Treatment factor, in contrast, proved significant for twelve of the fifteen variables, with effects noted across all four groups of dependent variables--achievement, attitude, cognitive beliefs, and classroom cognitive climate. The Teacher-by-Treatment interaction term proved significant for six variables. The interaction effects were particularly present in the classroom cognitive climate group.

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[1] The dummy variables for the Teacher factor were assigned as follows: Teacher 1 = -1; Teacher 2 = +1. The Treatment factor involved two dummy variable comparisons. The first contrasted the IC group with the two TGT conditions (IC = -2; TGT-A = +1; TGT-W = +1). The second contrasted the two TGT variations (IC = 0; TGT-A = -1; TGT-W = +1).

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Insert Table 2
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Academic Achievement: As indicated in Table 2, the analysis for the SCAT-STEP measure revealed no significant main or interaction effects of interest. The multiple regression analysis for the treatment specific achievement measure involved the following three terms: Teacher (A), Treatment (B), and A X B. The truncated model was used because no pretest data were collected for this dependent variable. The analyses revealed no Teacher main effect ($F = 1.40$; $df = 1,184$; $R^2_I < .01$), a marginally significant Treatment main effect ($F = 2.40$; $df = 2,184$; $P < .10$; $R^2_I = .02$), and a significant Teacher X Treatment interaction effect ($F = 4.60$; $df = 2,184$; $P < .025$; $R^2_I = .05$). The treatment cell means indicate a positive effect of TGT on performance ($\bar{X}_{IC} = 3.48$; $\bar{X}_{TGT\text{-}A} = 3.97$; $\bar{X}_{TGT\text{-}W} = 4.48$). The interaction effect is due to particularly high TGT-W scores for Teacher One, whereas TGT-A subjects scored particularly high for Teacher Two.

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Insert Tables 3 and 4, Figures 4-6
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Affective Response: As Table 3 indicates, significant ($P < .05$) Pretest, Teacher, and Treatment main effects were observed for the Attitude Toward American History measure. Figure 4 plots the treatment group mean scores for both pre and posttest scores, and reveals a positive TGT effect (10 is the neutral point on the scale). The analyses of the two LEI affective measures--Satisfaction and Apathy--are summarized in Table 4. The analyses indicate significant ($P < .01$) treatment effects at both midtest and posttest for Satisfaction and Apathy. The treatment group means are

plotted in Figure 5 (for Satisfaction) and Figure 6 (for Apathy). For both scales 12.5 is the neutral point. As the figures indicate, both TGT conditions created greater satisfaction and less apathy at both the midpoint and end of the experimental period.

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Insert Tables 5 and 6, Figures 7-9
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Cognitive Beliefs: The analysis for the Perceived Importance variable (cf. Table 5) revealed significant ($P < .05$) pretest and treatment main effects. The treatment effect, examined in Figure 7, indicates a positive TGT effect (12.5 is the neutral point of the scale). The analysis also revealed two significant two-way interactions (Pretest-by-Treatment, and Teacher-by-Treatment), as well as a significant three-way interaction. An examination of treatment group regression lines suggests that the Pretest-by-Treatment effect is due to the TGT-W having a positive effect only on the students who began the experiment with a high score on the perceived importance scale. The Teacher-by-Treatment effect appears to be due to greater importance in TGT classes of Teacher Two, whereas no difference was noted between the TGT and IC conditions for Teacher One subjects.

Table 5 also contains the analysis of the Efficacy scale. Significant ($p < .05$) Pretest and Treatment main effects were detected. The treatment main effect (cf. Figure 8) is due to greater Efficacy in the TGT conditions (10 is the neutral point of the scale). The analyses for the perceived Difficulty scale (Table 6) indicate significant ($P < .05$) Treatment and Teacher-by-Treatment interaction effects for the midtest. The treatment

main effect is due to lower perceived Difficulty scores in the TGT conditions. However, as Figure 9 indicates, this pattern holds only for Teacher One subjects. For Teacher Two, the differences are obliterated. The analyses of the posttest measure of Difficulty (Table 6) revealed similar results to those obtained for the midtest, although of less intensity.

Classroom Cognitive Climate: The data from the SBS observational measure of task behavior consist of frequencies of two types of behavior (task related vs. non-task) at the classroom level. Goodman's Multivariate Analysis of Qualitative data (Goodman, 1970) was employed and indicated significant Teacher ($Z = 14.96$; $P < .01$) and Treatment ($Z = 6.06$; $P < .01$) main effects. The Teacher-by-Treatment interaction effect was not significant ($Z = -.45$). The Teacher main effect is reflected in the following percentages of task behavior over total behavior: Teacher One = 88% (N = 2,096); Teacher Two = 85% (N = 1,666). The Treatment main effect takes the following form: IC = 83% (N = 1,666); TGT-A = 92% (N = 980); TGT-W = 87% (N = 1,142). In short, students in Teacher One's class and students in both TGT conditions evidenced greater task behavior.

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Insert Tables 7 and 8, Figures 10-12
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Table 7 contains the results of the analyses conducted for the six measures of classroom cognitive climate derived from the CAQ. For Factor I (Analysis) only the Treatment main effect for the posttest proved significant ($P < .05$). The treatment effect is depicted in detail in Figure 10. The treatment effect appears due primarily to the high level of Analysis activities reported by TGT-A subjects. No significant effects (Table 7)

were noted for Factor II (Synthesis). A significant ($P < .01$) treatment effect was noted for the Participation factor (F-III) at the posttest; however, the main effect is overshadowed by the significant ($P < .01$) Teacher-by-Treatment interaction at both midtest and posttest. The post-test treatment group means ($\bar{X}_{IC} = 7.48$; $\bar{X}_{TGT-A} = 8.48$; $\bar{X}_{TGT-W} = 8.22$) indicate a positive TGT effect on Participation. Table 8, which contains means for treatment groups within teachers, suggests the TGT effect is due primarily to Teacher Two.

For the Memorization Factor (IV) significant Treatment effects ($P < .05$) were noted at both midtest and posttest (Table 7). Additionally, a Teacher-by-Treatment interaction occurred for the midtest. The Treatment main effect (plotted in Figure 11) appears due to a particularly high level of memorization in TGT-W at midtest. At posttest both TGT conditions reported greater memorization functions. The interaction term is depicted in detail in Table 8. As Table 7 indicates, significant Teacher main effects ($P < .05$) were observed for both mid and posttest, and a significant Teacher-by-Treatment interaction ($P < .01$) was detected at the midtest. The teacher main effect appears due to assignment of more homework by Teacher Two (Posttest : $\bar{X} = 3.1$) than Teacher One (Posttest: $\bar{X} = 2.26$). The analysis of the Teacher Talk item (Table 7) indicates significant ($P < .01$) Teacher and Treatment main effects at both mid and posttests. The teacher main effect is due to a greater percentage of Teacher Talk for Teacher Two (Posttest: $\bar{X} = 54.6$) than Teacher One (Posttest: $\bar{X} = 40.8$). The treatment main effect, as delineated in Figure 12, is due to greater teacher talk in IC than in either of the two TGT conditions.

Overall, the analyses indicate widespread TGT main effects and infrequent Teacher as well as Teacher-by-Treatment interaction effects. For the dependent variables on which both midtest and posttest data were collected, the TGT main effects consistently held up across both data points. The TGT treatment effects appeared not to be substantially moderated by either teacher difference or length of time of implementation.

DISCUSSION

The present study was designed to assess the effects on students of two forms of an instructional technique, TGT, as implemented by two teachers in several high school social studies classes. The results indicate a clear and widespread effect of both TGT treatments on a variety of individual and classroom outcome variables, supporting the findings of earlier research with TGT (Edwards, et al., 1972; Edwards & DeVries, 1972). A significantly positive ($P < .10$) TGT effect was noted for one of two social studies achievement measures. With respect to affective responses of the students toward the class, TGT created more positive attitudes, greater satisfaction, and less apathy among the students. For the several measures of cognitive beliefs of the students, TGT made doing well in class more important to the students, created greater perceived efficacy, and resulted in less difficult classes (for one teacher). For the several measures of cognitive climate TGT created more frequent ontask behavior during an unstructured (by the teacher) study period, more analysis and memorization level activities (cf. Bloom, 1956), and resulted in less teacher talk. What follows is a more detailed interpretation of these results.

TGT-A vs. TGT-W: Of interest is the overall lack of significant differential effects of the two TGT treatments. Appendix E contains relevant F Ratios for the two dummy variable comparisons made under the Treatment factor in the general linear analysis. The first comparison was between IC and the two TGT treatments; the second comparison was TGT-A with TGT-W. Of the eleven dependent variables for which an overall treatment effect was detected, the IC vs. TGT comparison proved significant for every one, whereas the TGT-A vs. TGT-W comparison revealed significance for only two (CAQ: Memorization factor, and CAQ Analysis factor). In general the two TGT conditions created remarkably similar effects on student outcomes in spite of a major change in calculating team scores. Whether or not the scoring change affected team processes is being addressed in a different paper (DeVries, et al., 1974).

Several reasonable alternatives may explain the lack of systematic differences between the two TGT conditions: (1) Perhaps the tournament session placed strong demands for involvement on all students, consequently the additional weighting of team scores on low performing students had little additional motivational value. (2) TGT represents a dramatic restructuring of the classroom along many dimensions. Perhaps the treatment is so massive that varying only one structural factor is not easily detected by the students in the situation. (3) Earlier research on TGT (DeVries & Edwards, 1973) suggests that the treatment substitutes group competition for the competition among individual students within a classroom. If the comparison of scores across groups becomes most salient, what may be most important to the students is not how individual scores within

a team are weighted, but whether this weighting factor is constant across teams. (4) The positive effects on achievement noted by Hamblin, et al., (1971) for the low performance contingency may be due to the radical restructuring they created. Hamblin, et al., made a team score contingent only on the scores of the three lowest performers on the team. In the present study a less extreme weighting scheme was used. Perhaps for the weighting group contingency to have any greater effect than the unweighted alternative, the fate of the group must be totally contingent on the scores of a given subset of group members.

Teacher-by-Treatment Interactions: In assessing new instructional techniques an important question is whether they can be applied with equal success by different teachers in varied settings. The present study provided a partial test of this question for TGT. The results show some difference in effects across the two teachers. More specifically, Teacher Two (with 25-30 member classes) created more widespread positive TGT effects than did Teacher One (with 45-55 member classes). Perhaps innovation with small groups in large classes of students faces more formidable structural barriers and thus makes effective innovation with such techniques difficult.

Effects of TGT on Specific Variables: Specific TGT effects on the fifteen dependent variables deserve attention. The lack of a treatment effect on the SCAT-STEP social studies subtest may be due to the general nature of skills measured by the test, as pointed out in Buros' (1965) reviews of the SCAT-STEP series. Although the test provides useful norms on which student progress can be compared with that of a much larger

population, the test is not designed to be tied to specific courses or to specific bodies of content.

The strong positive effects of TGT on students' affective responses to the class confirm those obtained by earlier studies of TGT (Edwards & DeVries, 1972; DeVries & Edwards, 1973). The results of the present study also provide an interesting extension in that TGT appears to make students more satisfied with the general subject matter reviewed (in this case American History) as well as with the specific classroom experience.

The positive TGT effects on perceived importance of doing well in the classroom and on efficacy (feeling of the student that his efforts in the class are rewarded) are important. Kagan (1974), in a recent analysis of the pathologies of public education, has suggested that if students are to become involved in the learning processes then student values, interactions, and expectations must be changed. TGT changes both values and expectations in a constructive way.

The CAQ measure of classroom cognitive climate proved to be a sensitive measure of TGT effects. TGT reduced the amount of class time taken up by teacher talk and increased the amount of participation in class by the students. Such participation involved lower level cognitive activities (in Bloom's taxonomy), such as analysis. An important question is whether TGT can be extended to include higher level cognitive activities within the tournament structure.

Implications for TGT Research: This and other studies of TGT indicate a strong effect of the treatment on classroom processes and various outcomes with the exception of academic achievement. Further work with TGT should concentrate on alternatives of the treatment which might create a more direct and powerful impact on academic achievement. In light of the minimal effects created by altering the team reward allocation structure, a more promising modification of the technique might lie in altering the nature of the cognitive skills required in the tournament sessions.

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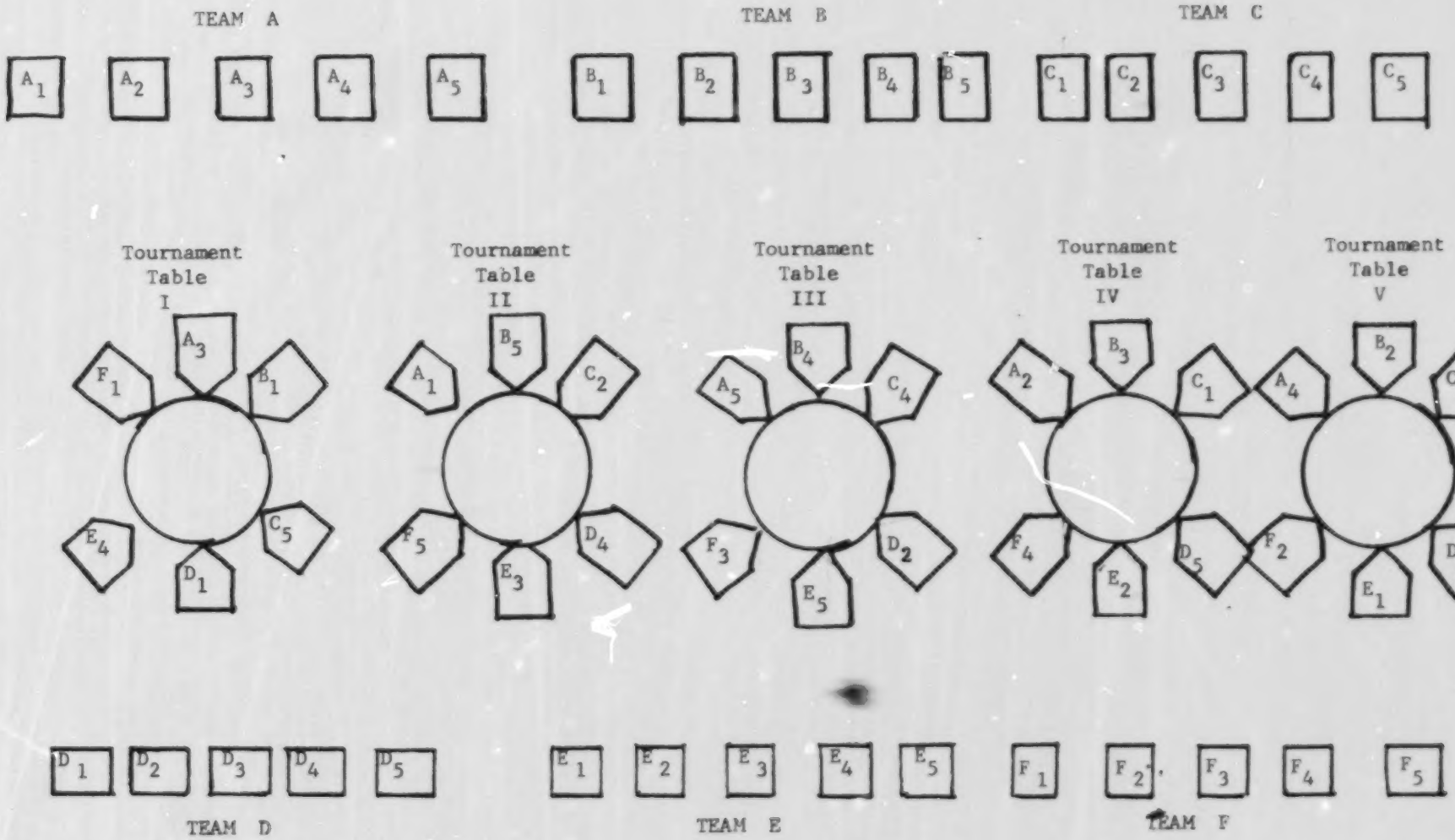
TEAM A
TEAM B
TEAM C
A1 A2 A3 A4 A5
B1 B2 B3 B4 B5
C1 C2 C3 C4 C5
Tournament Table I
Tournament Table II
Tournament Table III
Tournament Table IV
Tournament Table V
A3 F1 B1 C5 E4 D1
B5 A1 C2 D4 F5 E3
B4 A5 C4 D2 F3 E5
B3 A2 C1 A4 D5 F4 E2
B2 C3 D3 F2 E1
D1 D2 D3 D4 D5
E1 E2 E3 E4 E5
F1 F2 F3 F4 F5
TEAM D
TEAM E
TEAM F

Figure 1: Assignment of Teammates to Weekly Tournament Competition Tables

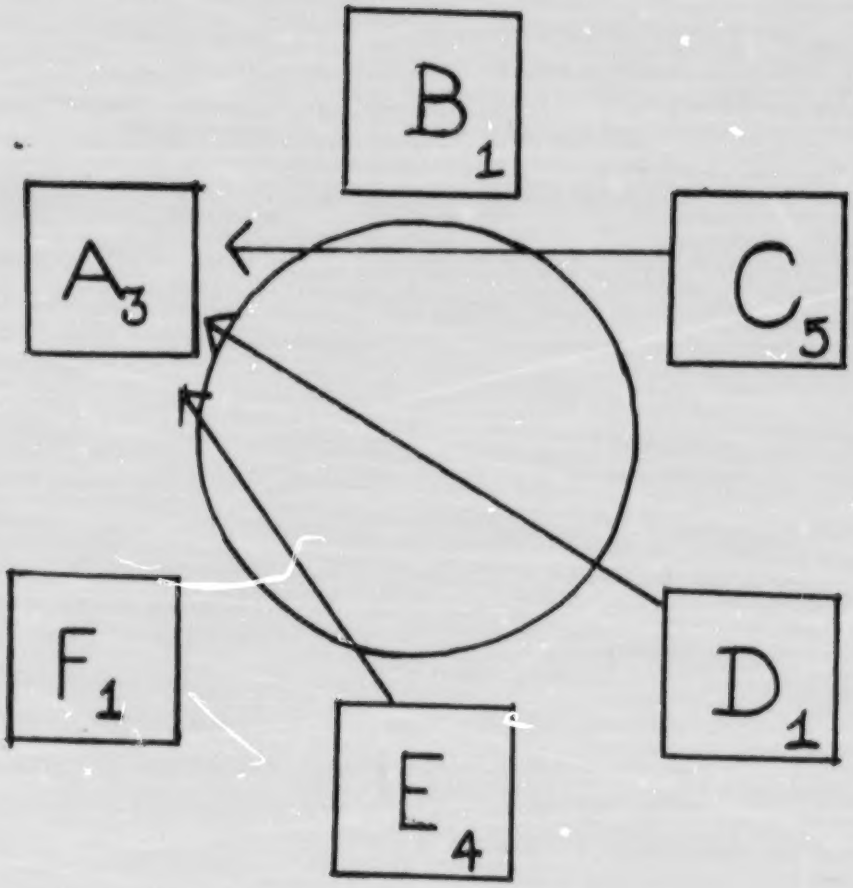

Figure 2: A Tournament Rating Structure

Teammate	Raw Score	Rank	Composite
A	7	1	7
B	6.5	2	13
C	6	3	18
D	5.5	4	22
E	5	5	25

Team score = 85/5 = 17

Figure 3: An Example of the Low Performance Weighted Team Scoring System

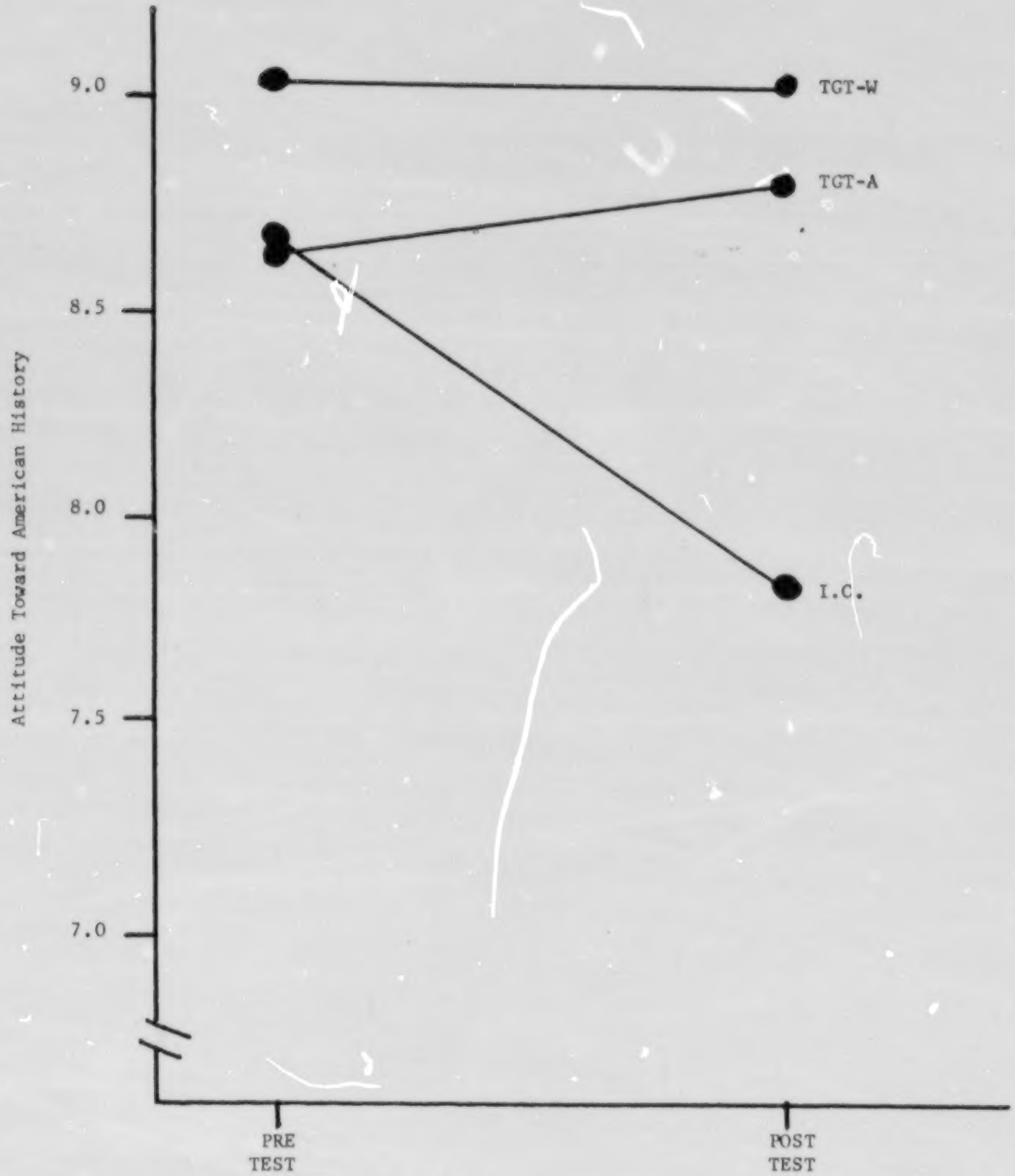

Figure 4: Mean Response, Attitude Toward American History Scale

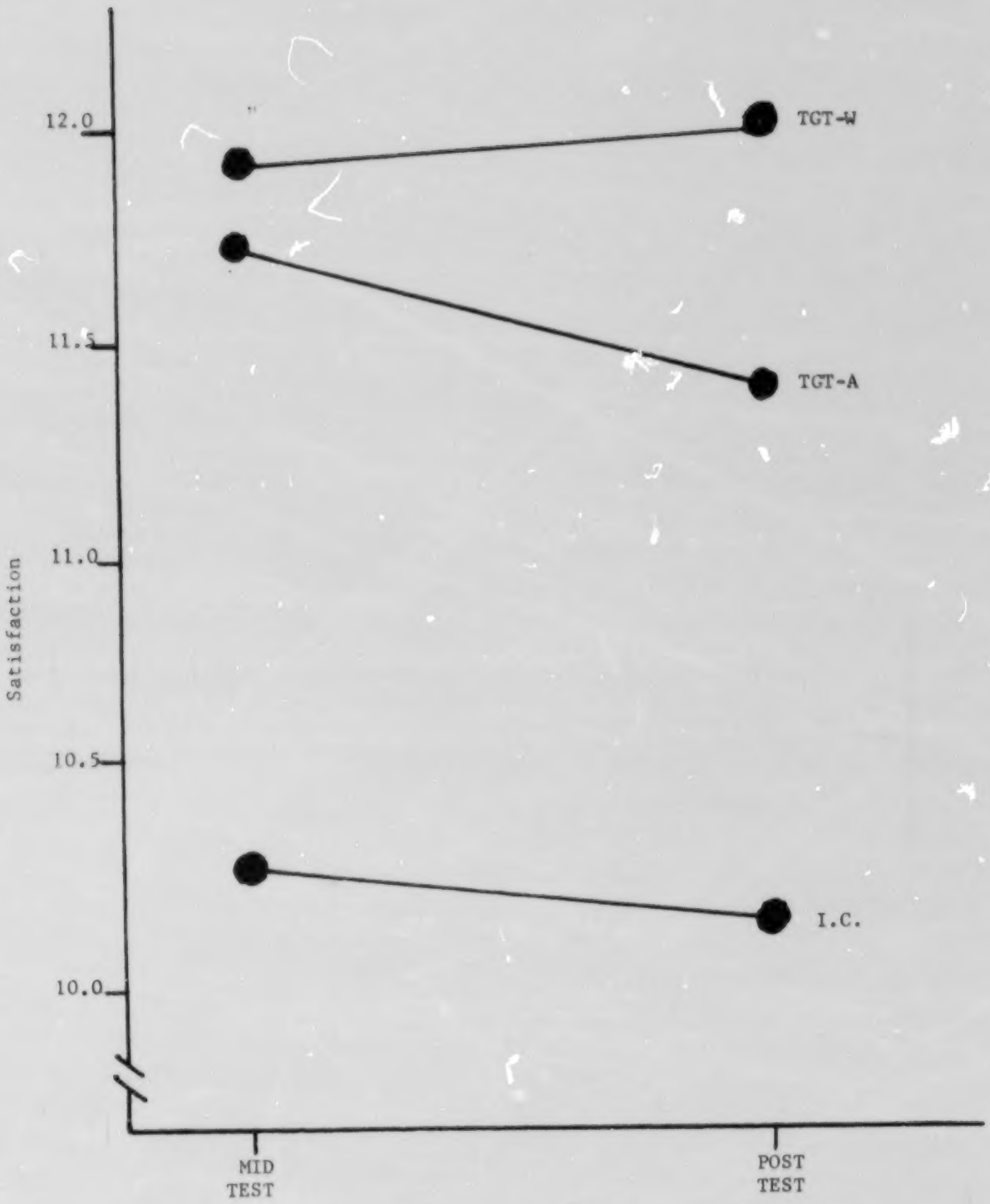

Figure 5: Mean Response, Student Satisfaction with Class Scale

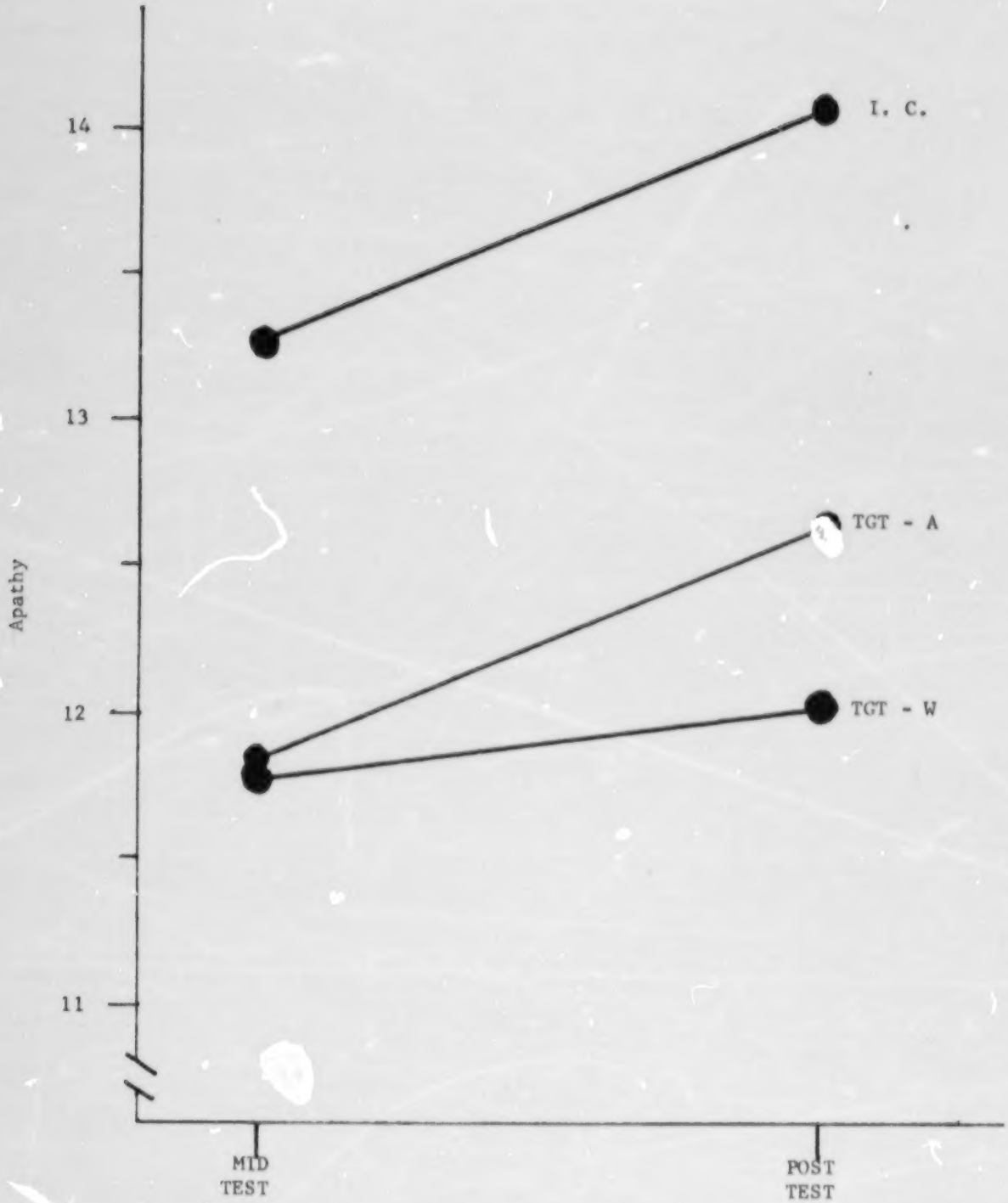

Figure 6: Mean Response, Student Apathy Scale

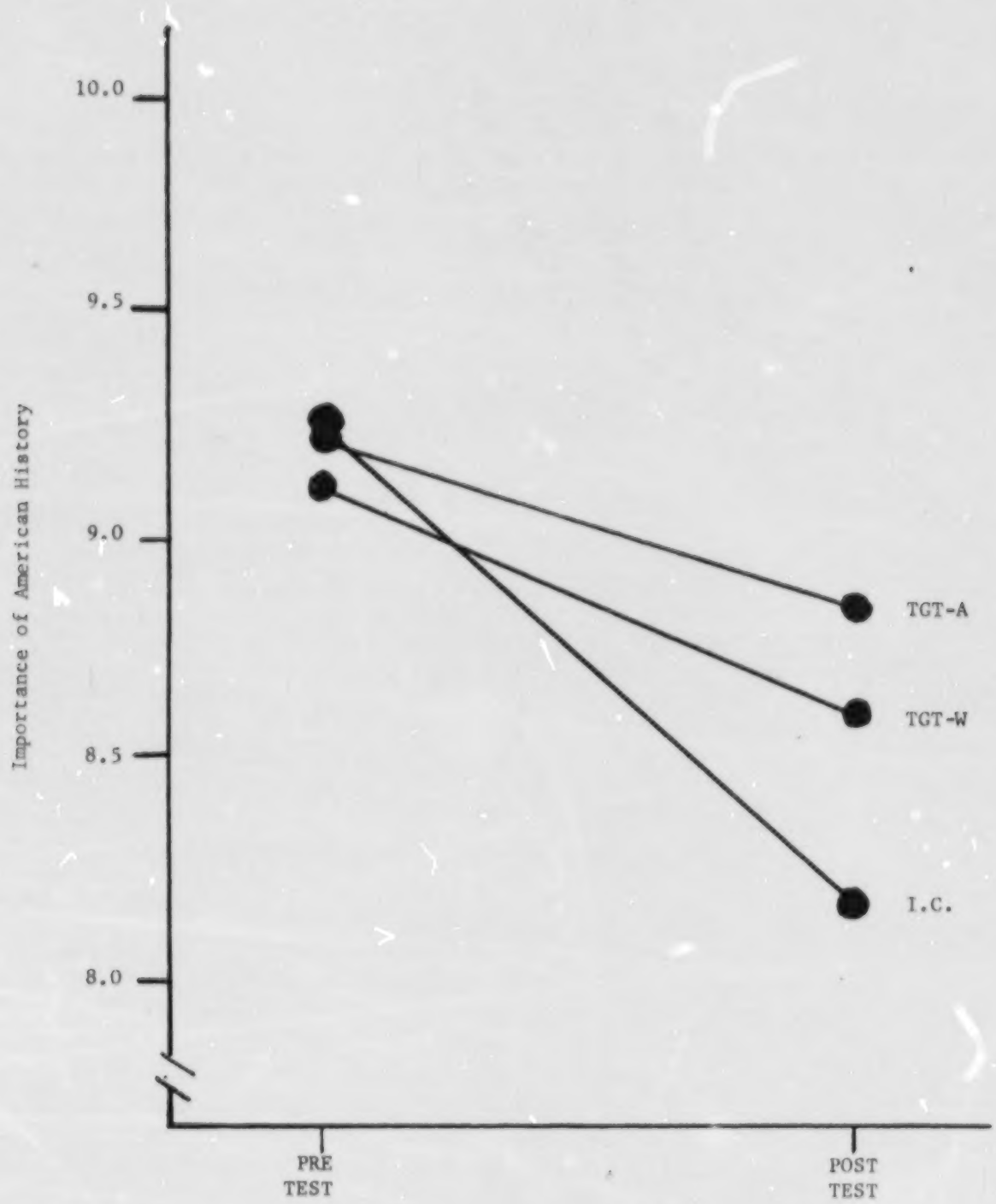

Figure 7: Mean Response, Perceived Importance of American History Scale

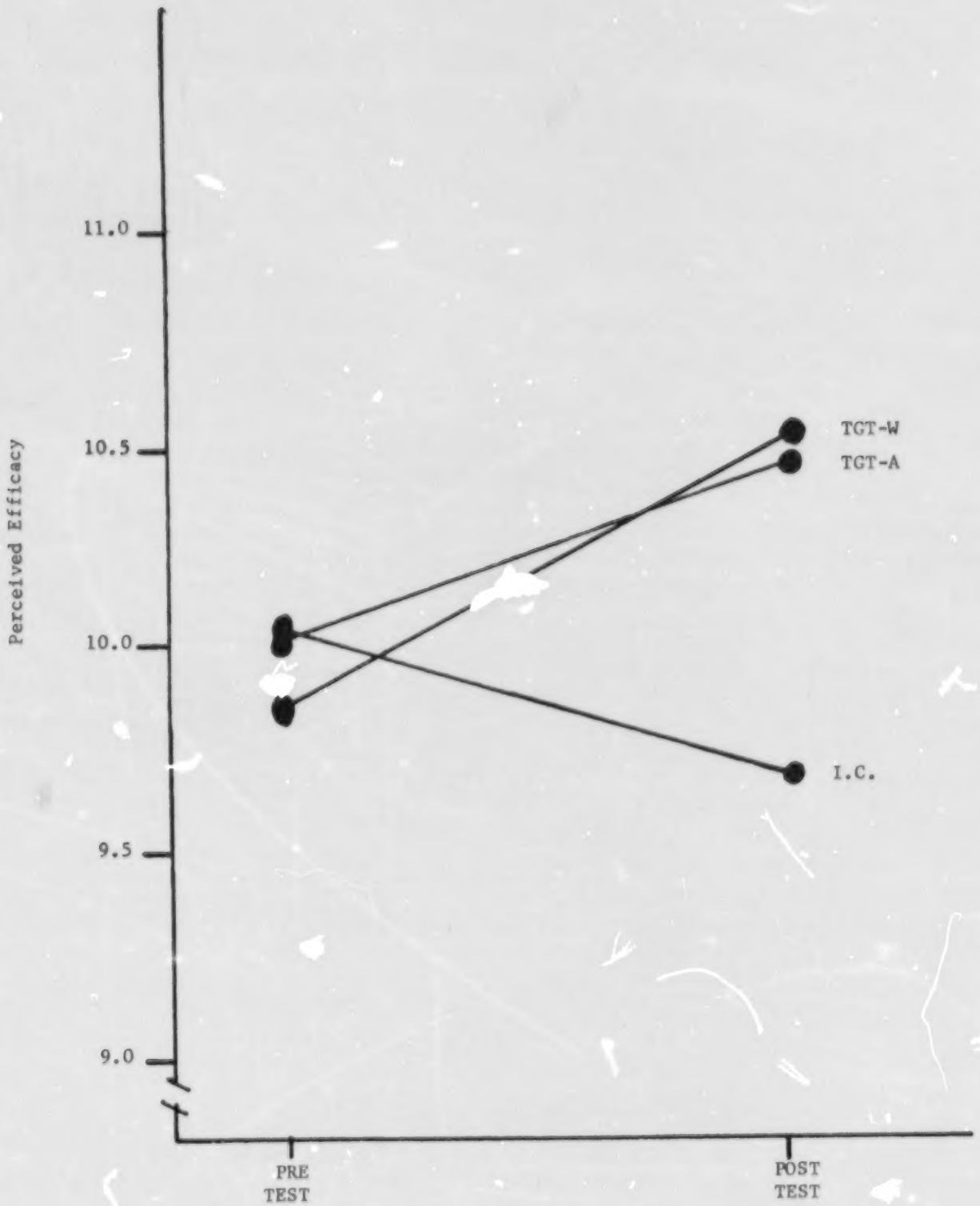

Figure 8: Mean Response, Perceived Efficacy in American History Scale

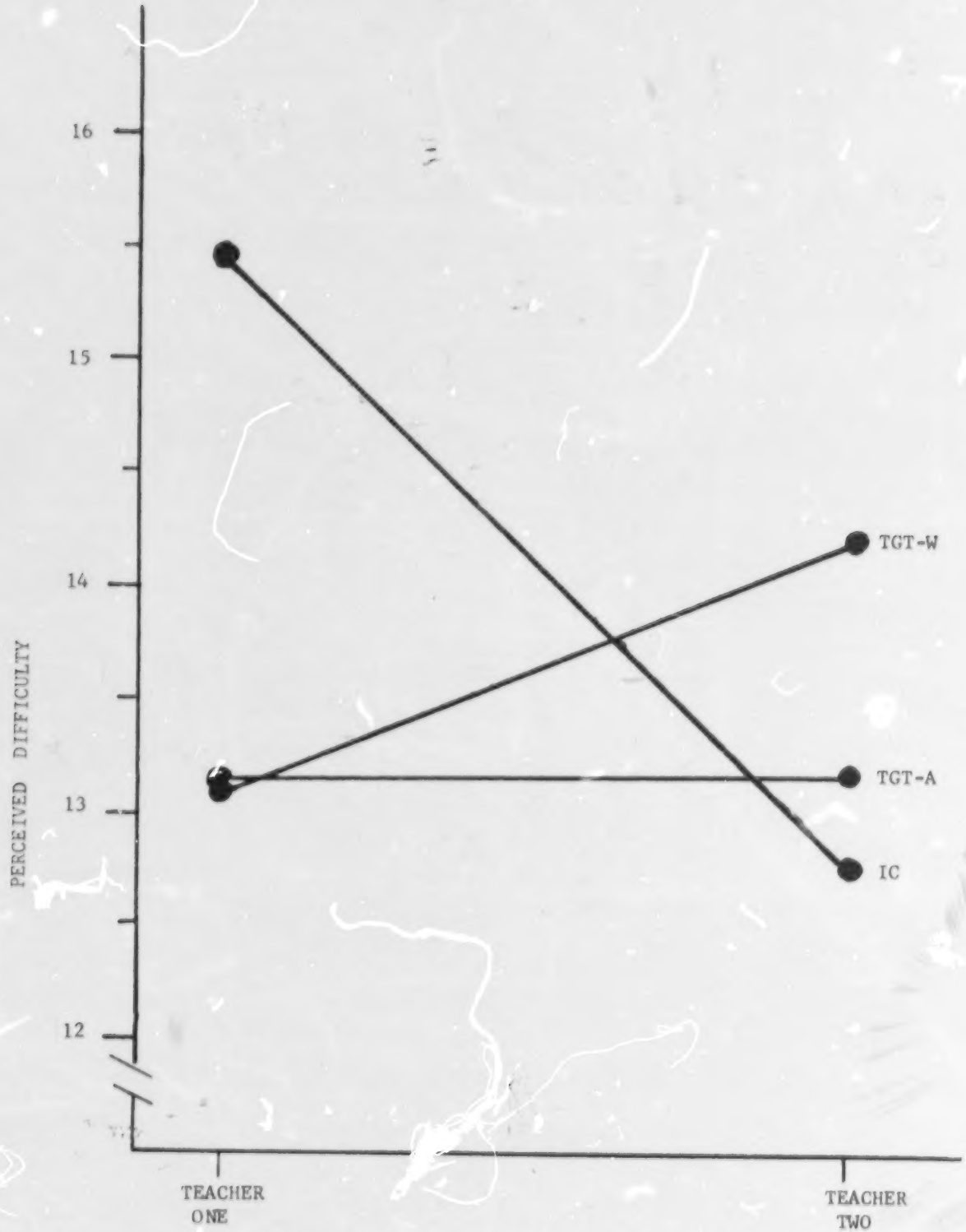

Figure 9: Midtest Scores on Perceived Difficulty Scale

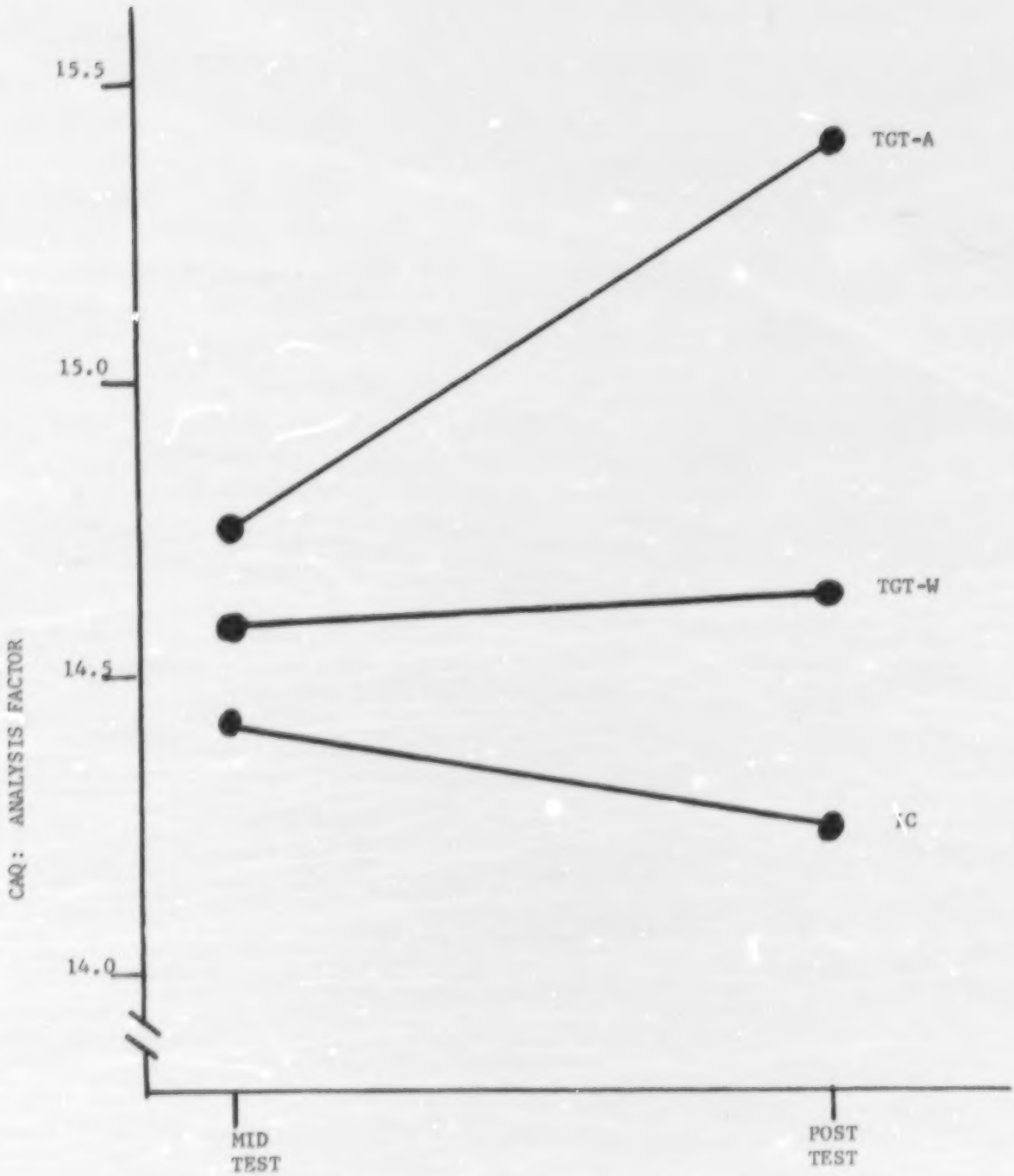

Figure 10: Treatment Group Means on CAQ Analysis Factor

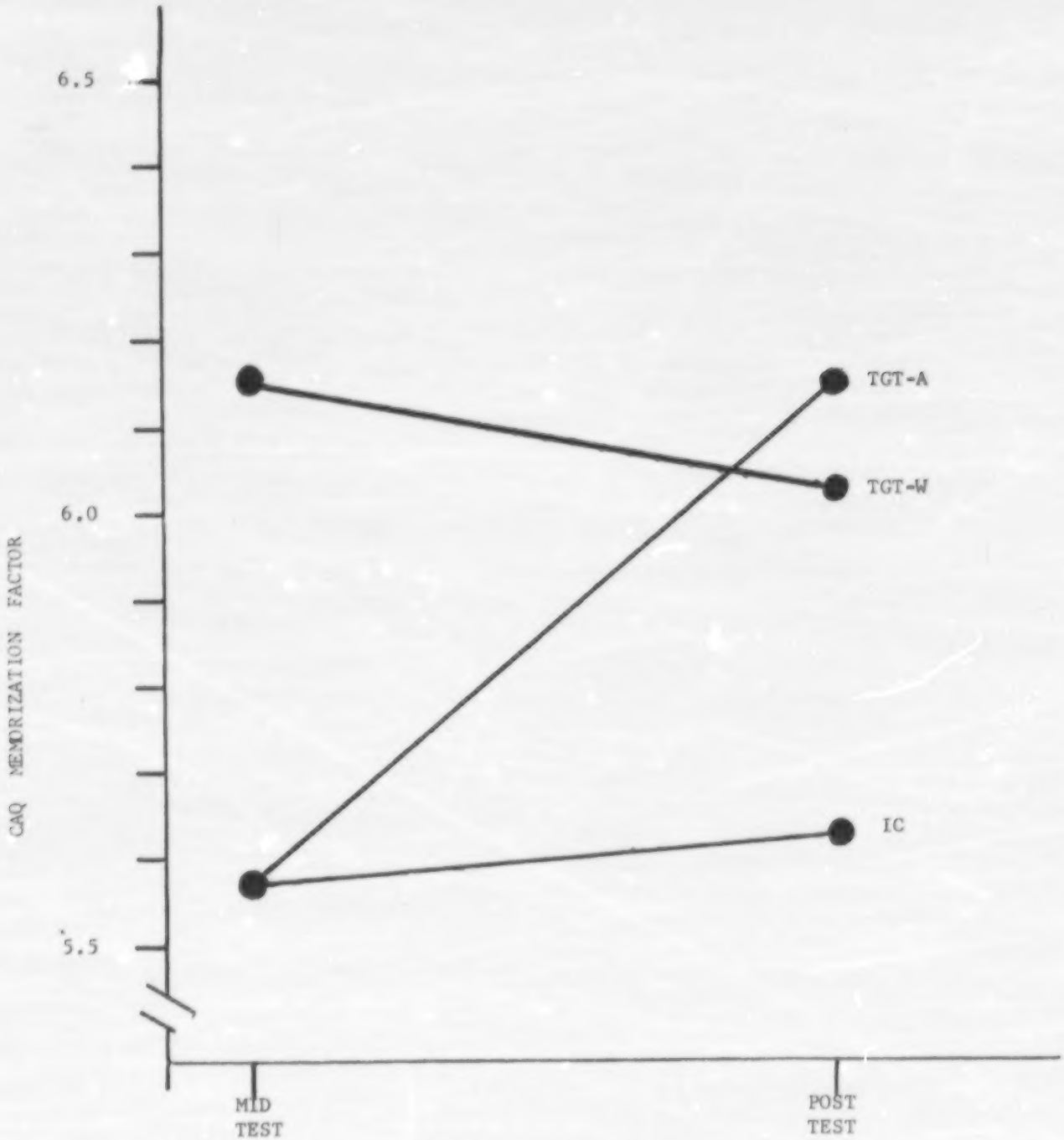

Figure 11: Treatment Group Means on CAQ Memorization Factor

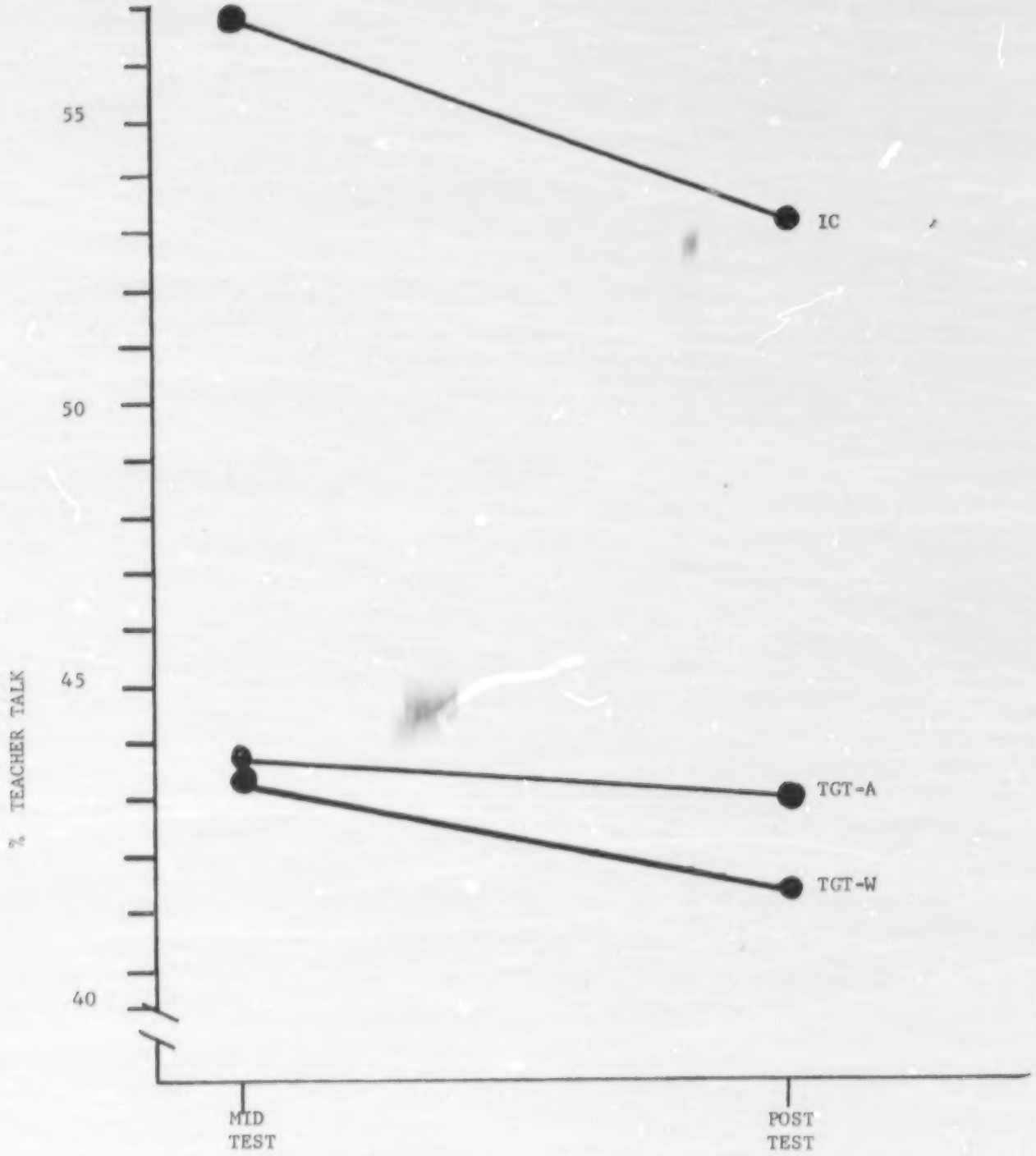

Figure 12: Treatment Group Means for CAQ Item Teacher Talk

Table 1

Summary of Major Results

DEPENDENT VARIABLE	TEACHER (A)	TREATMENT (B)	A X B
ACADEMIC ACHIEVEMENT			
(1) SCAT STEP test-post	---	---	---
(2) Achievement test-post	---	.10	.025
AFFECTIVE RESPONSE			
(1) Attitude American History-Post	---	.01	---
(2) Satisfaction-mid	---	.01	---
post	---	.01	---
(3) Apathy - mid	---	.01	---
post	---	.01	---
COGNITIVE BELIEFS			
(1) Importance American Hist.-post	---	.05	.05
(2) Efficacy in American History-post	---	.05	---
(3) Perceived Difficulty mid	---	.05	.01
post	---	.10	.05
COGNITIVE CLIMATE-CLASSROOM			
(1) Task Behavior (SBS) Post	.01	.01	---
(2) CAQ Factor I- Mid	---	---	---
Post	---	.05	---
CAQ Factor II-Mid	---	---	---
Post	---	---	---
CAQ Factor III-Mid	---	---	.01
Post	---	.01	.01
CAQ Factor IV-Mid	---	.01	.05
Post	---	.05	---
CAQ Homework- Mid	.05	---	.01
Post	.05	---	---
CAQ Teacher talk Mid	.01	.01	---
Post	.01	.01	---

Table 2

Multiple Regression Analysis of SCAT-STEP

SOURCE	R^2_I	F	df
PRETEST (A)	.347	98.94*	1,181
TEACHER (B)	.003	< 1	1,181
TREATMENT (C)	.003	< 1	2,181
A X B	.002	< 1	1,181
A X C	.003	< 1	2,181
B X C	.002	< 1	2,181
A X B X C	.006	1.11	2,181

*P < .01

Table 3

Multiple Regression Analysis of
Attitude Toward American History

SOURCE	R^2_I	F	df
PRETEST (A)	.301	86.96**	1,176
TEACHER (B)	.013	3.74*	1,176
TREATMENT (C)	.036	5.17**	2,176
A X B	.001	< 1	1,176
A X C	.008	1.15	2,176
B X C	.001	< 1	2,176
A X B X C	.027	3.88*	2,176

*P < .05
**P < .01

Table 4

Multiple Regression Analysis of Student Satisfaction and Apathy

SOURCE	SATISFACTION				APATHY			
	MIDTEST		POST TEST		MIDTEST		POST TEST	
	R^2_I	F	R^2_I	F	R^2_I	F	R^2_I	F
TEACHER (A)	.003	< 1	.003	< 1	.013	2.66	.000	< 1
	df = 1,177		df = 1,177		df = 1,178		df = 1,178	
TREATMENT (B)	.059	5.60*	.064	6.11*	.072	7.23*	.089	8.92*
	df = 2,177		df = 2,177		df = 2,178		df = 2,178	
A X B	.011	1.09	.014	1.39	.030	3.08	.025	2.48
	df = 2,177		df = 2,177		df = 2,178		df = 2,178	

*P < .01

Table 5

Multiple Regression Analysis of Perceived Importance and Efficacy

SOURCE	IMPORTANCE			EFFICACY		
	R^2_I	F	df	R^2_I	F	df
PRETEST (A)	.211	58.45**	1,176	.076	15.83**	1,176
TEACHER (B)	.006	1.67	1,176	.006	1.25	1,176
TREATMENT (C)	.034	4.73*	2,176	.033	3.44*	2,176
A X B	.000	< 1	1,176	.009	< 1	1,176
A X C	.024	3.34*	2,176	.014	1.46	2,176
B X C	.026	3.62*	2,176	.017	1.77	2,176
A X B X C	.028	3.90*	2,176	.000	< 1	2,176

*P < .05

**P < .01

Table 6

Multiple Regression of Perceived Difficulty

SOURCE	DIFFICULTY			
	MIDTEST		POST TEST	
	R_I^2	F	R_I^2	F
TEACHER (A)	.012	2.48	.014	2.62
		df = 1,178		df = 1,178
TREATMENT (B)	.044	4.58**	.031	2.95*
		df = 2,178		df = 2,178
A X B	.089	9.15***	.035	3.37**
		df = 2,178		df = 2,178

*P < .10
**P < .05
***P < .01

Table 7

Multiple Regression Analyses of CAQ Factor Scores

CAQ FACTOR			SOURCE		
			TEACHER (A)	TREATMENT (B)	A X B
FACTOR I ANALYSIS	MID	R^2_I	.017	.004	.023
		F	3.16	< 1	2.14
	POST	R^2_I	.000	.045	.012
		F	< 1	4.25*	1.13
FACTOR II SYNTHESIS	MID	R^2_I	.001	.005	.020
		F	< 1	< 1	1.83
	POST	R^2_I	.000	.029	.025
		F	< 1	2.74	2.36
FACTOR III PARTICIPATION	MID	R^2_I	.002	.025	.054
		F	< 1	2.44	5.26**
	POST	R^2_I	.000	.067	.062
		F	< 1	6.89**	6.37**
FACTOR IV MEMORIZATION	MID	R^2_I	.009	.064	.039
		F	1.80	6.41**	3.91*
	POST	R^2_I	.007	.036	.029
		F	1.35	3.46*	2.79
HOMEWORK	MID	R^2_I	.021	.020	.050
		F	4.12*	1.96	4.90*
	POST	R^2_I	.028	.009	.024
		F	5.30*	< 1	2.27
TEACHER TALK	MID	R^2_I	.102	.075	.006
		F	22.22**	8.17**	< 1
	POST	R^2_I	.077	.049	.000
		F	15.71**	5.00**	< 1
			df = 1,178	df = 2,178	df = 2,178

*P < .05

**P < .01

Table 8

Cell Means of CAQ Measure

		F-III		F-IV		HOMEWORK		TEACHER TALK	
		MID	POST	MID	POST	MID	POST	MID	POST
TEACHER ONE	IC (n=40)	8.32	7.87	5.72	5.90	2.58	2.30	49.25	47.50
	TGT-A (n=39)	8.44	8.13	5.36	6.18	2.41	2.13	39.87	38.33
	TGT-W (n=35)	7.86	8.06	6.00	5.91	2.40	2.37	37.00	35.71
TEACHER TWO	IC (n=24)	7.04	6.83	5.33	5.17	2.04	2.17	68.96	62.71
	TGT-A (n=22)	8.73	9.09	5.95	6.09	4.44	3.91	50.45	51.36
	TGT-W (n=24)	8.53	8.46	6.37	6.17	3.04	3.33	52.50	49.58

Appendix A

Scales Measuring Affective Responses to Treatments

Attitude Toward American History	Strongly Agree	Agree	Disagree	Strongly Disagree
1. I enjoy studying American History	SA	A	D	SD
2. Reading about American History makes me sleepy.	SA	A	D	SD
3. Compared to the other subjects I am taking, American History is much more fun to study.	SA	A	D	SD
4. I plan to take some more American History courses as electives later on in high school or college.	SA	A	D	SD
Satisfaction				
1. I enjoy the work in this class.	SA	A	D	SD
2. I like this class.	SA	A	D	SD
3. I do not like much that the class does.	SA	A	D	SD
4. I look forward to coming to this class.	SA	A	D	SD
5. After attending this class I have a sense of satisfaction.	SA	A	D	SD
Apathy				
1. It is easy for me to daydream in this class.	SA	A	D	SD
2. I am indifferent to what we do in this class.	SA	A	D	SD
3. I feel lazy when I am in this class.	SA	A	D	SD
4. I am interested in much of what we do in this class.	SA	A	D	SD
5. What we do in this class is of little importance to me.	SA	A	D	SD

Appendix B

Cognitive Belief Scales

IMPORTANCE	Strongly Disagree	Disagree	Agree	Strongly Agree
1. It doesn't matter to me how well I do in my American History class.	SD	D	A	SA
2. I get very disappointed if I do badly on an American History quize or test.	SD	D	A	SA
3. As far as my American History class is concerned, I can take it or leave it.	SD	D	A	SA
EFFICACY				
1. American History is hard for me to understand.	SD	D	A	SA
2. Sometimes American History does not seem to make any sense.	SD	D	A	SA
3. I usually do well on most American History tests.	SD	D	A	SA
4. Even if I worked hard in American History, my grades wouldn't improve very much.	SD	D	A	SA
DIFFICULTY				
1. I have to work hard in this class.	SD	D	A	SA
2. I tend to find the work of this class hard to do.	SD	D	A	SA
3. The way the teacher teaches is too simple for me.	SD	D	A	SA
4. I consider the class work easy.	SD	D	A	SA
5. I have trouble doing the advanced work of this class.	SD	D	A	SA

Appendix C

Factor Loadings for the Class Activities Questionnaire

	FACTOR I: Analysis	FACTOR LOADINGS
1.	Students are expected to go beyond the information given to see what is implied.	.41
2.	Great importance is placed on logical reasoning and analysis.	.53
3.	Using logic and reasoning processes to think through complicated problems (and prove the answer) is a major activity.	.43
4.	Students are expected to read between the lines to find trends and consequences in what is presented.	.64
5.	Students are encouraged to discover as many solutions to problems as possible.	.44
6.	Detailed examination of ideas and conclusions is a major activity.	.51
	FACTOR II: Synthesis	
1.	Students are urged to build onto what they have learned to produce something brand-new.	.48
2.	A central concern is practicing methods in life-like situations to develop skill in solving problems.	.47
3.	Students are encouraged to independently explore and begin new activities.	.48
4.	Inventing, designing, composing and creating are major activities.	.45
	FACTOR III: Participation	
1.	The class actively participates in discussions.	.41
2.	There is little opportunity for student participation in discussions.	.42
3.	There is little joking or laughing in this class.	.45
	FACTOR IV: Memorization	
1.	Remembering or recognizing information is the student's main job.	.56
2.	Great emphasis is placed on memorizing.	.40

Appendix D

Post-test Correlations Among CAQ Scales

	(1) Analysis	(2) Synthesis	(3) Participation	(4) Memorization	(5) Teacher Talk	(6) Homework
1		.44	-.18	.26	.11	-.12
2			-.06	.07	.15	-.15
3				-.09	.09	.33
4					.01	-.10
5						.07

Appendix E

Planned Comparisons Associated with Multiple Regression Analyses

DEPENDENT VARIABLE		IC vs. TGT F	TGT-A vs. TGT-W F
ACADEMIC ACHIEVEMENT			
1. Achievement test -	Post	3.57*	< 1
AFFECTIVE RESPONSE			
1. Attitude American History -	Post	9.80***	< 1
2. Satisfaction -	Mid	11.02***	< 1
	Post	10.56***	1.56
3. Apathy -	Mid	13.99***	< 1
	Post	16.24***	1.25
COGNITIVE BELIEFS			
1. Importance American History -	Post	6.76**	< 1
2. Efficacy -	Post	6.35**	< 1
3. Difficulty -	Mid	7.73***	< 1
	Post	5.15**	< 1
COGNITIVE CLIMATE CLASSROOM			
1. CAQ - F-I	Post	5.11**	3.35*
F-III	Post	12.04***	< 1
F-IV	Mid	3.24*	9.36***
	Post	6.50**	< 1
Teacher Talk -	Mid	16.24***	< 1
	Post	9.73***	< 1

*P < .10 **P < .05 ***P < .01